Chatbot Based Intervention To Treat Test Anxiety

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Abstract
Test anxiety is one of the key challenges faced by students all over the world. While students use various technologies to help their revision, existing applications are unable to accomplish the dual goals of helping the students revise as well as motivating them and reducing test anxiety. This project proposes the design and implementation of a chatbot that could accomplish these goals through a conversational interface.

Author Keywords
Test anxiety; conversational interface; chatbot; emotional reassurance

ACM Classification Keywords
K.3.1 [Computer Uses in Education]: Design, Human Factors.

Introduction
Anxiety related to examinations, commonly referred to as test anxiety, is a situation specific emotional problem that is experienced by students all over the world. At HKUST, 10 out of 14 surveyed students identified the key reasons for test anxiety being a lack of confidence that stems from not being able to sufficiently evaluate their preparation. Students have been actively using computer-based tools such as flash cards and quizzes to aid their preparation, however,

these tools rely on students to motivate themselves and do not provide active feedback and motivation.

Conversational Interfaces (CIs) allow users to interact with systems using text through natural language processing. These are most commonly used in chatbots. A chatbot could potentially act as a tutor by helping students identify their weaknesses to focus further preparation.

Background

In 1967, Liebert and Morris identified two key components of test anxiety, 'Worry' and 'Emotionality' [1]. Worry is more closely related to the social anxiety related to the feeling of failing to achieve ones goals, while Emotionality refers to the emotional arousal felt during performance evaluation situations. Worry has shown to be more related to poorer exam performance [2], however, few studies have been conducted into reducing test anxiety through reducing Worry before exams.

Recently, the co-relation between test anxiety and computer based testing has been studied [3], as well as the possibility of a computer program to treat test anxiety [4]. However, the programs rely on relaxation and desensitization, both of which affect Emotionality rather than Worry as they do not directly help the students gain confidence. Similarly, there are many applications such as Quizlet [5], which aim to allow students to test themselves, but the unsupervised nature of these tools prevents them from providing active feedback.

Pereira's recent work shows that chatbots can be used to improve self-guided learning through conversational quizzes [6]. This project aims to build upon these findings by adding two elements to the chatbot: motivation and personalized feedback.

Design

The proposed chatbot could be made available on any existing messaging platform that supports a bot API such as Facebook Messenger, Slack or Telegram. To easily reach an existing audience, Facebook Messenger would be ideal, and further design is done with Messenger as the chosen platform.

As proposed by Pereira in [6] a conversational quiz system can be used to test students, but the multiple-choice question (MCQ) based responses would not provide much information about the user. As such, the bot's NLP capabilities could be tapped into to allow users to enter answers that should match or closely resemble pre-defined answers. An engine like IBM 's Watson could then be used to perform emotional analysis on the non-question related conversation that the bot can have with the user.

Finally, a motivation element should be added with simple positive reinforcement through congratulatory messages for correct answers. Additionally, the bot could not the types of questions that the user is incorrectly answering and provide personalized feedback to them.

Prototype

This concept was prototyped to better understand the technology limitations and to identify challenges. An online bot prototyping framework called BotSociety [7] was used to create a visual representation of the final interaction between the user and the bot on the

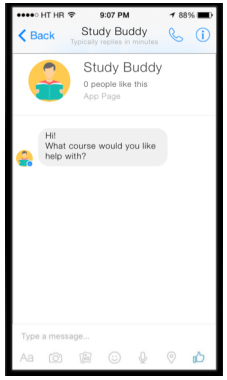

Figure 1: Screenshot of prototype start screen.

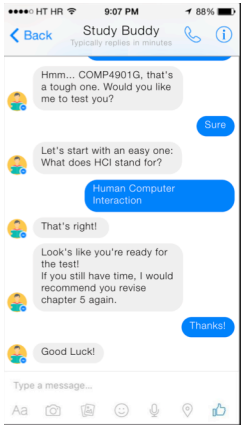

Figure 2: Screenshot of prototype end screen, showing sample conversation.

Facebook Messenger platform. The prototype does not feature extended questions and answers; rather it focuses on displaying new elements proposed by this project.

Implementation

The chatbot would be useful only if it could tap into existing knowledge to formulate questions and answers. Artificial Intelligence and Machine Learning techniques could be combined with web scraping tools to gather knowledge from notes, lecture slides and other test materials to serve this purpose.

For prototyping and initial testing, the AI training could be skipped and an MCQ approach could be used as well as direct pattern matching. The focus would be on designing the bot's speech and choice of words that should be calming and confidence inducing in order to motivate the user.

Potential Evaluation

In the HKUST focus group, 12 out of 14 (~85%) students said that a tool that could help them identify the weak spots in their preparation would help reduce test anxiety. Given that students spend considerable time online during exams, a tool like this would be easy to access, and would potentially reduce test anxiety by giving students confidence in their preparation.

Conclusion

This project proposes a solution to the widespread problem of test anxiety through the implementation of a 'Study Buddy' chatbot that can help students revise their materials while building their confidence for the examination. While this project could certainly improve the lives of students in the present, further development in AI and NLP will drive emotional intervention using conversational interfaces even more in the future.

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